MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2016/2017

DCS5078 – DATABASE SYSTEMS
(For Diploma Students Only)

8 MARCH 2017
2:30PM – 4:30PM
(2 Hours)

INSTRUCTIONS TO STUDENT :

1. This question paper consists of 7 pages with 3 sections.

2. Answer **ALL** questions.

3. For **section A** and **B**, shade your answer on the OMR sheet provided.

4. For **section C**, write your answers in the answer booklet provided.

Section A: Multiple Choice Questions (Total: 20 Marks)
Instruction: Please shade your answers on the OMR sheet provided.

1. A _____ acts as the interface between data stored on the disk and its user.
   - A. relational data
   - B. database
   - C. database management system
   - D. transaction

2. _____ means multiple copies of the same data items.
   - A. Data integrity
   - B. Data reduction
   - C. Data consistency
   - D. Data redundancy

3. The file in database management system (DBMS) is called as _____ in relational database management system (RDBMS)?
   - A. table
   - B. object
   - C. schema
   - D. console

4. The statement below refers to _____.

   > "A database designed to keep track the day-to-day transactions of an organization."

   - A. data warehouse
   - B. transactional database
   - C. desktop database
   - D. centralized database

5. Rows of the relation are referred to as _____ of the relation.
   - A. entities
   - B. attributes
   - C. tuples
   - D. domain

6. The values for an attribute or a column are drawn from a set of values known as a _____.
   - A. domain
   - B. tuples
   - C. attributes
   - D. entities

7. The first integrity rule of a relational model is _____.
   - A. attribute integrity
   - B. object integrity
   - C. referential integrity
   - D. entity integrity

8. Missing data in a field _____.
   - A. is illegal
   - B. is a null value
   - C. will cause an error
   - D. will cause a warning

9. The information system is composed of which of the following?
   - A. People
   - B. Application program
   - C. Procedure
   - D. All of the above.

10. There are six phases in the Database Life Cycle (DBLC). Which of the following is the fourth phase of DBLC?
    - A. Database design
    - B. Implementation and loading
    - C. Testing and evaluation
    - D. Maintenance and evolution

11. Analysis is part of Database System Life Cycle. Which of the following is **NOT** part of the actions required during the analysis phase?
    - A. Initial assessment
    - B. Feasibility study
    - C. Logical system design
    - D. Detailed system specification

Continued...

12. Which of the following **BEST** describe the below statement?

> *"A single designer is responsible to create the whole design alone. This kind of design is used in a simple system development."*

- A. Database design
- B. Centralized design
- C. Decentralized design
- D. Data modelling design

13. Which of the below **BEST** describe the below statement?

> *"Used to represent the static data structures in a data model."*

- A. Unified Modelling Language (UML) Diagram
- B. Entity Relationship Diagram (ERD)
- C. Entity Relationship Model (ERM)
- D. Data Flow Diagram (DFD)

14. Below is the comparison of terminologies in ER Model and UML Notation. What are the notation in UML for (a), (c), and the ER Model for (b)?

| ER Model	UML Notation
Entity	**(a)**
(b)	Object Identifier
Relationship	**(c)**

- A. (a) Association (b) Attribute (c) Class
- B. (a) Class (b) Primary Key (c) Association
- C. (a) Class (b) Association (c) Object Identifier
- D. (a) Association (b) Primary Key (c) Attribute

15. The following diagram indicates _____ .
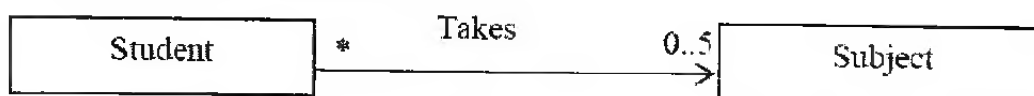
- A. A student can take exactly 5 subjects
- B. A student can take zero or up to 5 subjects
- C. A subject can be taken by zero or up to 5 students
- D. A subject can be taken by zero or more students

16. In a university environment, what is the appropriate multiplicity for an association linking courses with their list of pre-requisite courses? Focus on the numbers placed next to the 'Pre-requisite courses' side of the association.
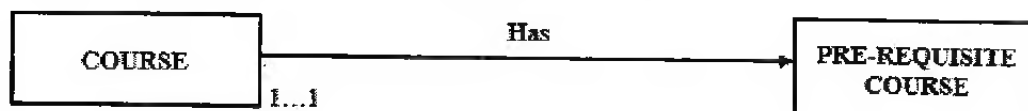
- A. 0...*
- B. 1...*
- C. 0...1
- D. 1...1

17. Why data is described as a corporate asset?
- A. Data are a valuable asset that require careful management.
- B. Data are a valuable resource that translate into information.
- C. Accurate, timely information triggers actions that enhance company's position and generate wealth.
- D. All of the above.

Continued...

18. The database administrator is responsible for which of the following, if both data and database administration exist in an organization.
   A. Data modelling   C. Database design
   B. Metadata   D. All of the above.

19. Database management system (DBMS) is able to facilitate the following within an organization; **EXCEPT** _____.
   A. Preservation and monitoring of user.
   B. Distribution of data and information.
   C. Control over data duplication and use.
   D. Interpretation and presentation of data.

20. Which of the following is a security measure for vulnerabilities affecting the network component?
   A. Intrusion detection system
   B. Implement file system security
   C. Apply application server patches
   D. Install antivirus and antispyware software

Section B: True / False (Total: 20 Marks)
Instruction: Please shade A for __True__ statements and B for __False__ statements in the OMR sheet provided.

21. The data organization refers to the way that the data is organized and is accessible from database management system (DBMS).

22. The object that is of interest to an organization is called entity.

23. The file management system suffers from the possibility of lack of data consistency.

24. Data dependence is essentially the separation of underlying file structures from the programs that operate on them.

25. A system catalog, or data dictionary, is a repository of information describing the data in the database.

26. In airline reservation system, the attributes for aeroplane are date, plane number, place of departure, destination, seats available, and type of plane. The primary key is plane number.

27. Each cell of a relation can hold multiple values.

28. In the relational model, many-to-many relationships can be directly represented by relations the way 1:1 and 1: N relationships can.

29. There are two types of database design strategies, which are top-down design and bottom-up design.

30. Implementation and loading is one of the phases of System Development Life Cycle (SDLC).

31. System analyst is a person who does research or investigation in order to establish the need for an information system.

32. Information systems are composed of people, hardware, software, database, application programs, procedures and network.

33. Any instance of subtype is also an instance of the superclass.

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34. A multi-valued attribute can be modelled by listing the components below the attribute.

35. The Unified Modelling Language (UML) database model is the most common database model in use today.

36. Specifying a zero (0) for the lower bound for the association multiplicity on a class diagram indicates that the item is optional.

37. Data redundancy is considered as dirty data.

38. Making technical decision or tactical decisions is part of the Operation level activity.

39. A database administrator develops and implements policies and procedures of how data shall be coordinated for a given system.

40. There are three security goals in the development of database, which are confidentiality, integrity and availability.

Section C: Structured Questions (Total: 60 Marks)
Instruction: Please write all your answers in the Answer Booklet provided.

QUESTION 1

Based on the following situation, draw a complete Entity Relationship Diagram using the **Crow's Foot** notation which includes:

(i)	All entities and attributes	(10 Marks)
(ii)	Relationships	(2 Marks)
(iii)	Connectivity and relationship participation	(4.5 Marks)
(iv)	Primary and foreign keys	(3.5 Marks)

A lecturer in a university can manage multiple projects. But, it is not compulsory for a lecturer to manage a project. Each project is managed by only one lecturer. Lecturer will have a staff number, a name, a rank, and a research specialty. Projects have a project number, a project name, a starting date, an ending date, and a budget.

Each project is worked on by one or more lecturers. Lecturer can work on multiple projects. Some lecturers may not be assigned to work on any project since they are requiring to do administrative works. The assign date and duration of the working project are stored as well.

Each project is worked on by one or more research assistants. The research assistants have a student number, a name, and a degree program. When research assistants work on a project, a lecturer must supervise their work on the project. Research assistants can work on multiple projects, in which case they will have a different supervisor for each one. Details of working project handled by research assistant are stored such as assign date and assign working hours for each project.

Lecturers and research assistants are attach to faculty. Faculties have a faculty number and a faculty name. Each lecturer is assign to one faculty but one faculty can consist of many lecturers. Research assistants have one faculty in which they are working on their degree.

[Total: 20 Marks]

QUESTION 2

City Table

CityCode	CityName	CountryCode	Pop2005	Pop2015
CC001	Bombay	400	18.2	22.6
CC002	Calcutta	400	14.3	16.8
CC003	Delhi	400	15.1	20.9
CC004	Dhaka	100	12.4	17.9
CC005	Jakarta	500	13	17.5
CC006	Lagos	800	11	17
CC007	Mexico City	700	19	20.6
CC008	New York	1000	18.5	19.7
CC009	Sao Paulo	200	18.2	20
CC010	Tokyo	600	35.2	36.2

Country Table

CountryCode	CountryName
100	Bangladesh
200	Brazil
300	China
400	India
500	Indonesia
600	Japan
700	Mexico
800	Nigeria
900	Russia
1000	USA

Write the SQL commands based on the tables given above.

(i)   Display the city details with country code either 400 or 500 and 2005 population more than 15 million. Use *In*.   (3 Marks)

CityCode	CityName	CountryCode	Pop2005	Pop2015
CC001	Bombay	400	18.20	22.60
CC003	Delhi	400	15.10	20.90

(ii)   Display the average population in 2015 for each country for average population more than 25 million.   (3 Marks)

CountryCode	Average 2015 Population
600	36.200000

Continued...

(iii) Display city name, population in 2015 and population in 2016 based on 5% increase of population in 2015 with 2015 population less than 20 million. Sort according to 2015 population from the highest to lowest population.   (3.75 Marks)

CityName	Pop2015	Pop2016
New York	19.70	20.6850
Dhaka	17.90	18.7950
Jakarta	17.50	18.3750
Lagos	17.00	17.8500
Calcutta	16.80	17.6400

(iv) Add another column called national language in table Country. The content of this column must not be NULL. Set the attribute to the best data type and length.

     (1.5 Marks)

(v) Add a new city in USA. You are free to use your own values for the rest of the city attributes except for country code.   (2.25 Marks)

(vi) Display the total number of 2005 population for each country for country name consists of character 'i'.   (4 Marks)

CountryName	Total Population In 2005
Brazil	18.20
India	47.60
Indonesia	13.00
Mexico	19.00
Nigeria	11.00

(vii) Display the city details with the highest population in 2015 and display as shown below.   (2.5 Marks)

CityCode	CityName	CountryCode	Pop2005	Pop2015
CC010	Tokyo	600	35.20	36.20

[Total: 20 Marks]

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QUESTION 3

Table 1: Sample GROUP record

Group ID	Group Description	Student ID	Student Name	Student Phone Number
4863	Batch 3 Tri 2/2016	1101192832	Sana Yap	0121234567
		1101112324	Ahmad Ali	0192837782
		1101145343	Mohan Harish	0117289463
3221	Batch 1 Tri 3/2016	1112991822	Wong Ah Jang	0182778298
		1119288392	Suresh	0198354426
		1119983728	Lisa Lang	0102837728
9821	Batch 3 Tri 3/2015	10982882918	Heilly Johnson	0192888291
		10929182982	Samsul Firdaus	0172837462
		10901928377	Siti Aishah	0198888273

Major Description	Major ID	Completed Credit Hour
Software Engineering	SE132	30
Financial Engineering	FE039	34
Software Engineering	SE132	43
Accounting	AA019	23
Business Administration	BA029	20
Business Administration	BA029	24
Software Engineering	SE132	45
Accounting	AA019	40
Financial Engineering	FE039	50

Note: The report above is actually one table but split into two to fit this A4 paper.

(i) Using the sample GROUP record shown in Table 1, draw the dependency diagram. Make sure you label the transitive and/or partial dependencies.   [5 Marks]

(ii) Using the initial dependency diagram drawn in (i), draw the new dependency diagrams for 2NF.   [5 Marks]

(iii) Using the initial dependency diagram drawn in (i) and (ii); draw the new dependency diagrams for 3NF.   [5 Marks]

(iv) Based on the dependency diagram drawn in (iii); write the relational schema.

    [5 Marks]

[Total: 20 Mark]

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